REMARKS

Claims 1-6 and 8 are now believed to be in accord with 35 USC 112, second paragraph. Applicant would appreciate any suggestions that the Examiner may have with respect to more clearly and distinctly presenting the claimed subject matter of applicant's invention as defined in the claims. The objectionable matter has now been deleted from the remaining claims herein.

Claims 1-6 and 8 are now believed to be patentable under 35 U.S.C. 103(a) over Reyna '412 in view of Lahti '487 or Haase '690, and Sheets '826. While Reyna is for wastewater treatment including laundries, the applicant takes issue with the Examiner's conclusion that such method of Reyna is "substantially as claimed".

Before presenting the specific claim recitations, a brief summary of the instant invention may be helpful.

Applicants' invention is used to clarify industrial laundry wastewater with a lower cost process that results in lower sludge generation and with sludge that can be dewatered in a plate and frame press. None of the prior art alone or in appropriate combinations accomplishes or suggests applicants' method. There is no pH adjustment required for applicants' invention. Applicants' invention consists essentially of a blended coagulating agent consisting of polydiallydimethalammonium chloride (pDADMAC) and aluminum chlorohydrate (ACH) as described and claimed, followed by a dry (then wetted) flocculating agent consisting of poly(acrylamide-coacrylate) (sodium acrylate) of a specific charge density and molecular weight. The results of applicant's invention produce clarified and compliant water with a reduction of sludge generated than other existing processes. The generated sludge of applicant's invention is then able to be dewatered in a frame and plate press.

The addition of any other known chemicals to applicants' method and or, any variation in the methods described in applicants' invention may result in rendering applicants' invention not achieving the intended results, increase the cost, be unnecessary, increase sludge volume, and create sludge that cannot be dewatered, particularly with a plate and frame press.

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The subject matter of this invention would not have been obvious even with the knowledge of all the referenced patents to a person having ordinary skill in the art. Therefore, those patents referenced by the Examiner are not believed to be pertinent or relevant for the following reasons:

Reyna's objective is the treatment of wastewater for the removal of dyestuffs (color), with COD, TSS, TDS and BOD being secondary. Applicants' objective is the removal of emulsified fats, oil and grease along with BOD, COD, TSS and other contaminants.

Reyna requires the use of acidification to maintain a pH of between 2 and 5. Acidification is not required in applicants' invention. Maintaining a pH range of between 2 and 5 will be detrimental to applicants' invention and will render applicants' invention inoperable. At this pH range flocculation in the instant invention will not take place together with other adverse reactions. The "normal" range of pH of between 7-12 Standard Units in an industrial laundry is acceptable to allow the instant invention to operate.

In Reyna, the acidified wastewater effluent is required to come into contact with a treatment paste primarily formed of magnesium hydroxide as the primary coagulant agent. In the instant invention a blended coagulant consisting of (polymerized) polydiallydimethalammonium chloride (pDADMAC) and aluminum chlorohydrate (ACH) as described is used as the coagulating agent. The use of magnesium hydroxide paste will render applicant's method inoperable. The use of any other coagulant agent will be detrimental to the instant invention and may render applicants' method inoperable.

Powdered activated carbon is added to the coagulant in Reyna. Powdered activated carbon is not used in the instant invention. The addition of powdered activated carbon would not benefit the instant invention and will increase the cost of the process.

Reyna uses aluminum hydroxide for flocculation. Aluminum hydroxide is not used in the instant invention. The use of aluminum hydroxide for flocculation will render applicants' invention inoperable.

Calcium carbonate is used in Reyna for the removal of metals. The instant invention does not use calcium carbonate. The use of calcium carbonate would increase

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the cost of the process and may render such process inoperable. Metals are usually removed to an acceptable level during the normal use of the instant invention.

In Reyna, magnesium orthophosphate is present for the reduction of arsenic and fluorides and as a buffer. Magnesium orthophosphate is not used in the instant invention. The use of magnesium orthophosphate would increase the cost of the process and may cause applicants' invention to be inoperable. Arsenic and fluorides are usually removed to an acceptable level during normal use of the instant invention.

"Other" precipitating agents can be used such as ferric chloride or sodium aluminates in Reyna. The use of "other" precipitating agents would increase the cost of the process in the instant invention. Other precipitating agents are not used in the instant invention and may cause the instant invention to be inoperable. Such "other" agents would necessarily increase the sludge volume generated. One of the main benefits of the instant invention is to eliminate these "other" precipitating agents in order to reduce the sludge volume and to reduce costs of the entire process.

In Reyna, a very wide range of flocculating agents could be used for flocculation. Polyacrylamide is mentioned as a possible flocculating agent. No mention is made as to the molecular weight or charge density, or other criteria to be used. Only the use of poly(acrylamide-co-acrylate) at the specified molecular weight, charge density and dose as described in the instant application will work as a flocculent and allow the sludge to dewater (a primary goal of the instant invention). The use of any other flocculent or flocculating agent may cause the instant method to be inoperable and not allow the sludge to properly dewater.

In Reyna there is no discussion as to the amount of sludge generated or its ability to be dewatered. There are no real world examples provided, and Reyna makes no mention of retention times for his chemistry. In Reyna the drawing does not even depict the commonly used systems found in industrial laundries.

Haase uses aluminum polymers and high molecular weight quaternized polymers to form a flocculated suspension, causing liquid-solid separation in low alkalinity wastewater (primarily at water processing plants). The floc (coagulated) particles are then removed by settling, floatation or filtration. Haase does not use a secondary flocculating agent. The instant invention uses only a blend of aluminum chlorohydrate (ACH) with poly

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di-allyl di-methyl ammonium chloride (pDADMAC) as a sole coagulant followed by poly(acrylamide-coacrylate) as the sole flocculent to remove contaminates from commercial laundry wastewater by settling or floatation. The wastewater is normally at a medium to high alkalinity range. No pH adjustment is required.

Haase also uses a blend of aluminum chlorohydrate (ACH), polyaluminum chloride (PAC), or poly-aluminum siloxane sulfate (PASS) with high molecular weight quaternized polymer di-allyl di-methyl ammonium chloride (DADMAC). The instant invention uses only a blend of aluminum chlorohydrate (ACH) with polymerized (di-allyl di-methyl ammonium chloride) (pDADMAC) in a specific ratio. Any variation of the ratio of pDADMAC to ACH other than that described in the disclosed invention will likely cause the invention to fail.

Haase combines a blend of aluminum polymer and aluminum chloride with DADMAC, and or, with epi-chlorohydrin di-methyl amine (Epi-DMA), and or, low molecular weight DADMAC. Only the use of blended pDADMAC (not DADMAC) with ACH in a specific ratio will work for the invention. The additional use of another aluminum polymer or aluminum salt, or the use of Epi-DMA or the use of DADMAC (monomer) will likely cause the invention to fail.

Haase suggests a preferable range of DADMAC to ACH of 10% to 90%. As previously stated, the instant invention uses a blend of aluminum chlorohydrate (ACH) with pDADMAC not DADMAC in a specific ratio as described in the instant application. Any other blend or ratio will likely cause the invention to fail. The possible combinations of inorganic and organic chemistries and their ratios mentioned by Haase are in the millions. What does that really teach one having ordinary skill in the art? It is unreasonable to believe that anyone normally skilled in the art could obviously derive the coagulant blend set forth in the instant invention from the Haase disclosure.

There are many other differences, such as the fact that in Haase there is no mention of retention times or injection points for the chemistry. In Haase there is no use of a separate flocculating agent after initial coagulation. In fact, Haase states that the elimination of such agents are a benefit to his invention. Without the use of the exact combination of pDADMAC/ACH blend as the coagulant followed by poly(acrylamide-co-acrylate) flocculent of the correct molecular weight and charge density, and dose, the instant invention would not be operable.

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In Haase there is no discussion as to the amount of sludge generated or its ability to be dewatered. The sludge produced by DADMAC and poly aluminum salts would not be able to be dewatered in a plate and frame press. This type of sludge is normally dewatered on a belt press and belt presses are not used in commercial laundries.

There are no examples of use in an industrial laundry or any other commercial waste water where the water has an initial heavy soil loading. All examples shown in Haase are of extremely low soil loading. The examples in Haase have results based on turbidity or NTUs. There is no data for the removal of contaminates other than oil and grease nor are the results measured in mg/liter, which is how it is normally measured. There is no data on effective removal of other contaminates including: BOD, COD, TSS, metals, etc.

Haase also does not indicate the combination of pDADMAC and ACH into a single solution.

The Lahti patent is for a method and apparatus to treat laundered household wash. The apparatus and method of Lahti is very specific and does not refer to chemistry other than "using an acidifying coagulant, particularly a metal-halo coagulant and preferably a polyaluminum chloride".

The instant invention uses the existing apparatus normally found at commercial laundries and a very specific combination of chemistry using a very specific process, to clean the waste stream of commercial laundries. The soil loading in a commercial laundry vs. household wash is significantly different as is the types of detergents and other cleaning agents used. There is no mention of a pDADMAC/ACH blend as described in the invention.

Lahti requires acidification of the effluent to a pH range of 8.5 to 11 for ½ hour followed by acidification of a pH range of 6.5 to 6.9. A coagulant is then added to the effluent, preferably poly-aluminum chloride with a basicity of 45% to 50% to lower the effluent to a pH of about 5.2 to 5.4 to allow the effluent to coagulate to form treated water and sludge.

In the instant invention, acidification is not required. The existing equipment at commercial laundries will not allow these kinds of pH adjustments. The cost to do such pH adjustments would be prohibitive. The "normal" range of pH in an industrial laundry is

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acceptable to allow the instant invention to work. The use of poly-aluminum chloride as the coagulant will not be operable. The pH range of 5.2 to 5.4 will not allow for flocculation using poly(acrylamide-coacrylate) flocculent as described in the instant invention and will likely cause the invention to fail.

Lahti uses a weak anion exchange resin to further filter the effluent to remove MBAS (surfactants). This step is neither used nor required in the instant invention.

In Lahti there is no use of a separate flocculating agent after initial coagulation. Without the use of the exact combination pDADMAC/ACH blend coagulant followed by poly(acrylamide-co-acrylate) flocculent the instant invention will not work.

In Lahti there is no discussion as to the amount of sludge generated or its ability to be dewatered. The sludge produced by the use of a coagulant alone would not be able to be dewatered in a plate and frame press or any other generally used dewatering device.

There are no examples of use in an industrial laundry. There is no data of removal of contaminants. Lahti describes in Claim 17 the utilization of a coagulant (poly aluminum chloride) as the most desirable chemical for this invention and only mentions in passing the use of DADMAC (monomer) and other organic/inorganic blends. The instant invention uses pDADMAC (polymer).

In this patent, Sheets discusses in general some of the different apparatus and methods for dewatering sludge. The methods discussed include a plate and frame press among others, but does not discuss the actual methods of their use nor the requirements for actual dewatering sludge, much less the dewatering of commercial laundry sludge. The chemistry and process described in the instant invention creates a sludge that can be dewatered in a plate and frame press. The use of a plate and frame press is common in commercial laundries as in other industries where sludge must be dewatered. The instant invention creates a sludge that can be dewatered without the need for inorganic aids such as bentonite clay, ferric salts, perlite, harborlite, lime, or DE to mention a few. This is a primary benefit to the instant invention.

It is not possible for someone skilled in the art to "modify Reyna by adding the recited blend and utilizing the recited press, in view of the teachings of Lahti or Haase and Sheets respectively", and come up with the instant invention for the reasons cited above and those following:

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1) None of the recited patents discusses the reduction of sludge or its ability to be dewatered in a plate and frame press. This is one of the primary benefits of the instant invention. Applicants' submit that no sludge produced by a combination of the recited patents would be sufficiently reduced nor be able to be pressed in a plate and frame press.

2) Reyna is a complicated process using numerous possible coagulants, precipitating agents, buffers, flocculants and other aids. His process also requires extreme pH adjustments that simply will not work if applied to the coagulant and flocculent used in the instant invention. Reyna would be cost prohibitive nor would it be operative in the commercial laundry industry. There is no similarity to the instant invention. Substitution or insertion of a blend (coagulant) as described in either Haase or Lahti would not produce the instant invention and may not be operative in combination with the other components of the Reyna invention. The suggested use of a polyacrylamide as a flocculating agent is too vague a teaching to be useful in obviously arriving at applicants' claimed invention.

3) Haase names numerous possible coagulant combinations of aluminum salts and aluminum polymers blended with DADMACs (monomers) quaternized DADMACs and or Epi-DMA. The millions of possible combinations and ratios (permutations) of chemistries named in the patent make it beyond the ability of anyone skilled in the art to obviously arrive at the blend used in the applicants' claimed invention. There is not a coagulant per Haase that could be substituted in Reyna that would produce applicants' claimed invention. The Haase invention also requires low alkalinity and does not use a separate flocculating agent. The effluent treated by Haase has extremely low soil loading and the patent does not have any examples that indicate the removal of contaminates found in commercial laundry wastewater. This would lead someone skilled in the art to dismiss this process as being inapplicable to the commercial laundry industry.

4) Lahti uses a complicated apparatus and method utilizing extreme pH adjustments and long water retention times to clarify household laundry wastewater. Neither the chemistry used, the apparatus used, the method used, nor the long retention times would be applicable to commercial laundries. Applicants believe that no part of this invention could be a substitute in the Reyna invention.

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5) Sheets does not discuss the ability to dewater sludge generated at a commercial laundry. It is primary to the instant invention that only through the use of the coagulant and flocculent named in the instant invention and by using the method described that a sludge will be generated that can be dewatered in a plate and frame press.

6) It is not possible for anyone having normal skill in the art to come up with the instant invention by inserting a blend (coagulant) named in Haase or Lahti into Reyna (a method for clarifying laundry wastewater). Sheets does not address the ability of commercial laundry sludge to dewater in a plate and frame press.

7) The recited patents could not produce the exact combination of chemistry used in the instant invention nor the process used. There are millions of possible combinations of the chemistries and ratios of chemistries listed, and no one skilled in the art would be able to determine which to use based on these referenced patents. It is only through the use of the chemistries and processes described in the instant invention that results in advances made in accord with this invention. In fact, over 30 industrial laundries have adopted and are using the invention herein and thereby lowering the cost of treating the wastewater, lowering the volume of sludge generated, and creating sludge that can be dewatered in a plate and frame press.

Claim 1, as now amended, differs from Reyna in many important aspects as set forth above and specifically by reciting, inter alia, "clarifying industrial laundry wastewater containing surfactants, fats, oil and grease (FOG), total petroleum hydrocarbon (TPH), biochemical oxygen demand (BOD), chemical oxygen demand (COD), total suspended solids (TSS), ionized metals and other contaminants, and dewatering of the sludge in the wastewater using a plate and frame sludge press, consisting essentially of the steps of:

(a) adding to the wastewater an effective amount of a water dispersed cationic blended coagulant whose major components are of pDADMAC and ACH, at between 50 ppm and 700 ppm to break the emulsified bond in the wastewater and produce coagulated particles having sufficient mass and cationic charge to react with an anionic flocculent to be added thereafter;

(b) delaying any flocculent addition by at least a predetermined time to permit the cationic blended coagulant to substantially complete the coagulation of the particles in the wastewater in step (a);

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(c) adding to the wastewater an effective amount of a dry anionic flocculent which has been wetted with water, at between 5 ppm and 50 ppm, of sufficient molecular weight and charge density to react with the cationic charged coagulated particles to form flocculated waste particles of effective size to form sludge while leaving a disposable clarified water, thereby lowering the amount of sludge generated by at least 30% of that normally generated;

(d) separating the sludge from the clarified water;

(e) passing the sludge to a plate and frame sludge press;

(f) dewatering the sludge by the press, thereby forming a disposable sludge cake; and

(g) disposing of the sludge cake and the clarified water.".

While Lahti, at col. 6, lines 58-60, discloses suitable coagulants, appropriate for use in a Laundromat or household wash, including "polyaluminum chlorides (PAC), aluminum chlorohydrates, and poly DADMAC, and polymer mixtures or derivatives thereof" and then beginning at line "The most preferred coagulant is polyaluminum chloride (PAC). This teaching of Lahti would certainly not lead one skilled in the art to obviously modify Reyna in the manner only set forth by the Examiner. Also Lahti separates the coagulated sludge from the wastewater and does not use any form of press much less a plate and frame press.

While Haase's processes are directed toward clarifying raw waters and somewhat to wastewaters, he does not use any secondary flocculating agent nor disclose the specific ratios set forth in Claim 1, nor use a plate and frame press to dewater the sludge. One skilled in this art cannot merely pick and choose the chemical polymer blends, as set forth in Haase and Lahti, and obviously use same in Reyna and expect that such a modification of Reyna would even be operable to clarify the wastewater from an industrial laundry nor that the resulting sludge would be dewaterable by a plate and frame press as set fort in applicant's claim above.

While Sheets mentions use of a plate and frame filter press, and applicant's readily admit that many industrial laundries use such a press, this does not imply that the Reyna process, as inappropriately modified by Lahti and/or Haase, would eve produce any

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flocculated waste products that could be dewatered by a plate and frame press. To state or imply anything to the contrary is simply not so.

Only by viewing applicants' invention in hindsight would one be able to arrive at applicants' claimed invention. The Examiner's statement in the last sentence of the paragraph bridging pages 2 and 3 of the Office Action is unsupported by any art of record and is contrary to the facts presented in this application. The industrial laundries were faced with many problems, one of which was being able to dewater the sludge by a plate and frame press and applicants' invention has solved such problem. Other problems included the fact that the water allegedly clarified did not meet the standards permitted to be disposed. Applicants' invention met and exceeded those standards. Again, over 30 industrial laundries have adopted and are using applicants' invention, which is indicative of the commercial success of applicants' invention.

Accordingly, applicants' believe that claim 1, as now amended, and claims 2-6 and 8 are believed to be patentable over Reyna in view of Lahti and/or Haase and further in view of Sheets for reasons set forth above, and for the additional limitations set forth in the dependent claims 2-6 and 8.

Reconsideration and allowance of the claims is respectfully solicited.

The undersigned attorney would greatly appreciate a telephone interview with the Examiner, prior to any final action on the merits to discuss and resolve any remaining issue and to consider suggestions that the Examiner may make to render the claims more in accord with 35 USC 112 (2nd paragraph) and/or to more clearly define over the prior art of record.

Respectfully submitted,

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